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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,976	07/13/2006	Hiroshi Yamamoto	EL/2-22873/CGJ 133/PCT	3607

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EXAMINER

BIANCHI, KRISTIN A

ART UNIT	PAPER NUMBER
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4131

MAIL DATE	DELIVERY MODE
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05/09/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/551,976	Applicant(s) YAMAMOTO ET AL.	
	Examiner KRISTIN BIANCHI	Art Unit 4131	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 15-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/05/2007 and 01/06/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-13 and 15-21 are currently pending in the instant application.

Information Disclosure Statements

The information disclosure statements (IDS) submitted on January 6, 2006 and March 5, 2007 were in compliance with the provisions of 37 CFR 1.97 and 37 CFR 1.98. The information disclosure statements were considered and signed copies of the 1449 forms are enclosed herewith.

Priority

This application claims benefit of EPO Patent Application No. 03100972.3 filed on April 10, 2003.

Election/Restrictions

Applicant's election of Group I and the compound G-13 (of Example 4 on page 58 of the instant application) in the reply filed on December 3, 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

The requirement is still deemed proper and is maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

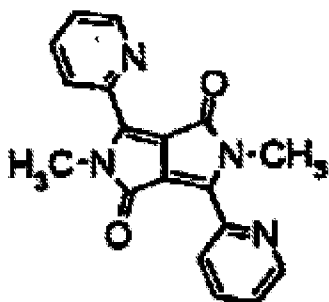
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

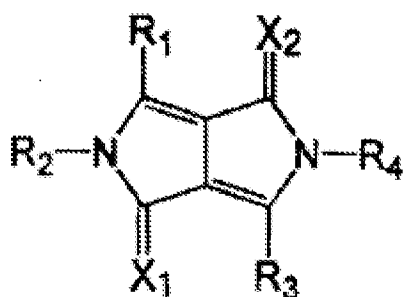
Claims 1, 2, 3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langhals *et al.* (US Patent No. 5354869, Oct. 11, 1994) in view of JP-A2 9003448 and US Patent No. 5,571,359.

Determination of the scope and contents of prior art.

Langhals *et al.* discloses the following diketopyrrolopyrrole compound (in Example 10).



JP-A2 9003448 teaches compounds for an electroluminescent element of the formula (on the first page of patent):



wherein R^1 to R^4 can be H, a (substituted) aliphatic group, a (substituted) aliphatic ring, a (substituted) homocyclic aromatic ring, a (substituted) heterocyclic ring; X^1 to X^2 can be O, S or dicyanomethylene.

US Patent No. 5,571,359 teaches pyrrolopyrrol pigments of the formula given on column 4 wherein R_1 and R_2 are each independently alkyl, arylalkyl, aryl, substituted or unsubstituted isocyclic or heterocyclic aromatic radicals; R_3 and R_4 are each independently H, substituted or unsubstituted alkyl, alkoxy carbonyl, aroyl, phenyl, benzoyl, benzyl, arylalkyl, aryl, alkanoyl, C_{5-6} cycloalkyl, alkenyl, alkynyl, carbamoyl, alkylcarbamoyl, arylcarbamoyl, or alkoxy carbonyl; X is O or S.

Ascertaining the differences between prior art and the instant claims.

The diketopyrrolopyrrole compound disclosed in Langhals *et al.* is different from the diketopyrrolopyrrole compounds of the formula I in the instant claims because the heterocyclic rings in Langhals *et al.* are not substituted.

The diketopyrrolopyrrole compounds of formula 1 in the instant claims are anticipated by the compounds disclosed in JP-A2 9003448 and US Patent No. 5,571,359 when, for example, A^1 to A^2 are substituted heterocyclic rings and R^1 to R^2 are C_1 - C_8 alkyls. Although JP-A2 9003448 and US Patent No. 5,571,359 teach compounds with these formulas (i.e. wherein A^1 to A^2 are substituted heterocyclic rings and R^1 to R^2 are C_1 - C_8 alkyls in formula I of the instant claims), they do not disclose embodiments of these specific compounds.

Resolving the level of ordinary skill in the pertinent art – Prima Facie Case of Obviousness.

The only difference between the fluorescent diketopyrrolopyrrole compounds in the instant claims and the diketopyrrolopyrrole compound disclosed in Langhals *et al.* is the substitution of the heterocyclic rings in the instant claims. JP-A2 9003448 and US Patent No. 5,571,359 teach compounds which are used for fluorescent purposes and include substitution on the heterocyclic rings, therefore, it would have been obvious to one of ordinary skill in the art at the time the

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invention was made to substitute the heterocyclic rings of the diketopyrrolopyrrole compound disclosed in Langhals *et al.* to arrive at the fluorescent compounds disclosed in the instant claims.

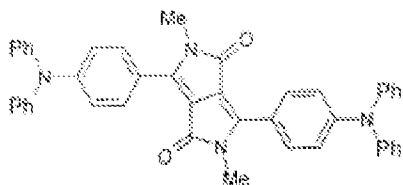
One of ordinary skill in the art at the time the invention was made would be motivated to make the modification required to arrive at the instant claims with reasonable expectation of success for obtaining compounds with the same fluorescent activity. The motivation to make compounds of the instant claims would be to make additional compounds for fluorescent purposes.

Thus, the instant claims are *prima facie* obvious over the teachings of the prior art.

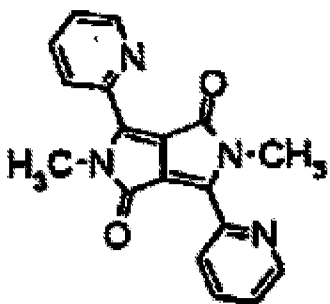
Claims 1, 3, 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1,087,005 in view of Langhals *et al.*

Determination of the scope and contents of prior art.

EP 1,087,005 discloses fluorescent diketopyrrolopyrroles such as the following compound (in paragraph [0013] on page 5).

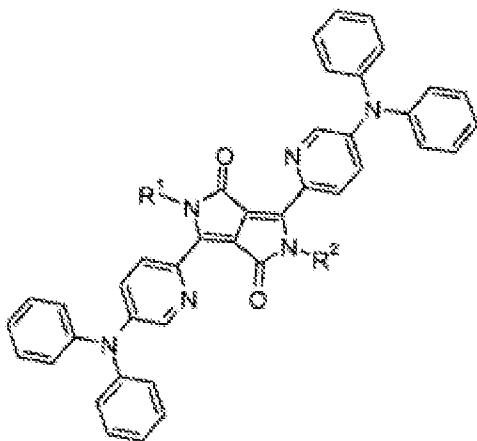


Langhals *et al.* discloses the following diketopyrrolopyrrole compound (in Example 10).



Ascertaining the differences between prior art and the instant claims.

Claims 1, 3, 4 and 19 of the instant application disclose compounds of the following formula:



wherein R¹ and R² comprise C₁-C₁₂-alkyl groups.

The compound disclosed in the instant claims has a pyridine in its structure whereas the compound disclosed in EP 1,087,005 has all phenyl groups.

Resolving the level of ordinary skill in the pertinent art – Prima Facie Case of Obviousness.

The fluorescent diketopyrrolopyrrole compound disclosed in the instant claims wherein R¹ and R² are C₁-C₁₂-alkyl groups is only different from the fluorescent diketopyrrolopyrrole compound disclosed in EP 1,087,005 by having a pyridine in its structure instead of all phenyl groups. Many references, such as Langhals *et al.*, disclose compounds which have pyridines in their structure and they are used for fluorescent purposes. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrive at the compound in the instant claims by substituting the phenyl attached to the fused bicyclic core in the diketopyrrolopyrrole compound disclosed in EP 1,087,005 for a pyridine since all of these references use these compounds for fluorescent purposes.

One of ordinary skill would be motivated to make the modifications required to arrive at the instant invention with reasonable expectation of success for obtaining compounds with the same fluorescent activity. The motivation to make the claimed compounds would be to make additional compounds for fluorescent purposes.

Thus, the instant claims are *prima facie* obvious over the teachings of the prior art.

Claims 1, 5-10, 13, 15-17 and 20-21 are rejected under 35 U.S.C. 103(a) as being obvious over EP 1,087,006 in view of Oxtoby, David W. and Nachtrieb, Norman

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H., *Principles of Modern Chemistry, 2nd Edition, Saunders College Publishing, 1990*, page 483.

Determination of the scope and contents of prior art.

EP 1,087,006 teaches an electroluminescent device (EL) comprising an anode, a hole transport layer, a light-emitting layer, an optional electron transport layer, a cathode and a light-emitting substance (paragraph [0001]). The light-emitting substance is a diketopyrrolopyrrole compound of formula I or III wherein R_1 and R_2 can be independently selected as C_1 - C_{25} alkyl, for example, and Ar_1 and Ar_2 can be independently selected as aryl radicals (page 1). In paragraph [0003], EP 1,087,006 teaches that it is commonly known in the art to employ a two component (Host-Guest) composition as the light-emitting material in an EL device and that it is important that the fluorescent spectrum of the host overlaps the absorption spectrum of the guest material (paragraph [0011]). In paragraph [0017], EP 1,087,006 teaches that the object of the invention was to provide EL devices emitting yellow, orange or red light. EP 1,087,006 teaches, in paragraph [0038], a composition of light emitting material and a polymer binder (high molecular weight organic material) formed by mixing the light emitting material with a polymer binder. The ratio of binder to light emitting material is in the range of 10:1 to 1:50.

Oxtoby, David W. and Nachtrieb, Norman H., *Principles of Modern Chemistry, 2nd Edition, Saunders College Publishing, 1990* teaches that the spectrum for red, orange and yellow light is about 630-700 nm, 590-630 nm and 560-590 nm, respectively.

Ascertaining the differences between prior art and the instant claims.

The instant claims disclose compounds and compositions of diketopyrrolopyrrole compounds of formula I and formula II wherein A^1 and A^2 are substituted heteroaryl groups and aryl groups, respectively. EP 1,087,006 teaches compositions of diketopyrrolopyrrole compounds of formula I wherein A^1 and A^2 are aryl groups. EP 1,087,006 does not, however, give specific embodiments of compounds that would anticipate the compounds of formulas I and II in the instant claims.

EP 1,087,006 also teaches that the object of the invention was to provide EL devices emitting yellow, orange or red light, but does not give specific emission peak wavelength ranges for the diketopyrrolopyrrole compounds.

The instant claims disclose a composition comprising a colored high molecular weight organic material comprising both 99.99 to 50% by weight of a high molecular weight organic material and 0.01 to 50% weight of either a fluorescent diketopyrrolopyrrole according to claim 1 or 0.01 to 50% weight of a composition

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according to claim 5. These ranges fall within the range of the ratio of binder to light emitting material disclosed in EP 1,087,006, however, the diketopyrrolopyrrole compounds differ as mentioned above.

Resolving the level of ordinary skill in the pertinent art – Prima Facie Case of Obviousness.

EP 1,087,006 does not give specific embodiments of compounds that would anticipate the compounds of formula I and II in the instant claims. EP 1,087,006 does disclose, though, that the A¹ and A² groups of formula I consist of aryl groups. The A¹ and A² groups in the instant claims consist of heteroaryl and aryl groups, therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the specific heteroaryl and aryl groups given in the instant claims under the general "aryl" group for formula I in EP 1,087,006.

One of ordinary skill would be motivated to make the modifications required to arrive at the instant invention with reasonable expectation of success for obtaining compounds and compositions with the same fluorescent activity. The motivation to make the claimed compounds and compositions would be to make additional compounds and compositions for fluorescent purposes (i.e. to be included in electroluminescent devices).

EP 1,087,006 teaches that the object of the invention was to provide EL devices emitting yellow, orange or red light, but does not give specific emission peak wavelength ranges for the diketopyrrolopyrrole compounds. Oxtoby, David W. and Nachtrieb, Norman H., *Principles of Modern Chemistry, 2nd Edition*, Saunders College Publishing, 1990 teaches that the spectrum for red, orange and yellow light is about 630-700 nm, 590-630 nm and 560-590 nm, respectively. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make a composition wherein the host chromophore is a diketopyrrolopyrrole compound which produces a photoluminescence emission peak at 500-720 nm or 520 to 630 nm.

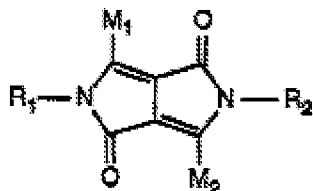
Thus, the instant claims are *prima facie* obvious over the teachings of the prior art.

Claims 1, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE4435211 in view of US Patent No. 4,415,685.

Determination of the scope and contents of prior art.

DE4435211 discloses compounds that are suitable as electrochromic materials such as the following compound (Table 1 on page 6):

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wherein M_1 and M_2 are non-substituted pyridine groups and R_1 and R_2 are methyl groups.

US 4,415,685 discloses 1,4-diketo-pyrrolo[3,4-c]-pyrroles of formula (I) (column 1) wherein R_1 and R_2 are isocyclic or heterocyclic aromatic radicals and when R_1 and R_2 are aromatic radicals, such as phenyl, diphenyl or naphthyl radicals, these can contain the “usual non-water-solubilizing substituents, such as halogen atoms, for example chlorine, bromine or fluorine.” US 4,415,685 teaches that when the compounds of formula (I) are dissolved in the applied polymers, they are likewise distinguished by a pure shade, high coloring strength and good fastness to light, and in addition by high fluorescence. Also, as seen in Table 1 on column 15, when a halogen is added to the phenyl group as opposed to a methyl group, there is a shift in the shade of color.

Ascertaining the differences between prior art and the instant claims.

The instant claims disclose diketopyrrolopyrrole compounds of formula III wherein A^7 and A^8 can be pyridine groups which have a chlorine or bromine atom as a substituent.

US 4,415,685 discloses 1,4-diketo-pyrrolo[3,4-c]-pyrroles of formula (I) which can have aromatic radicals, such as phenyl, which are substituted with a halogen atom. US 4,415,685 does not disclose 1,4-diketo-pyrrolo[3,4-c]-pyrroles which have pyridine groups with halogen atoms as substituents.

DE4435211 discloses diketopyrrolopyrrole compounds with pyridine groups, but they are not substituted with halogen atoms.

Resolving the level of ordinary skill in the pertinent art – Prima Facie Case of Obviousness

DE4435211 discloses diketopyrrolopyrrole compounds with pyridine groups, but they are not substituted with halogen atoms. Since there are references, such as US 4,415,685, which disclose diketopyrrolopyrrole compounds with halogen atoms as substituents on the isocyclic groups, it would have been obvious to one of ordinary skill in the art at the time of the invention to add halogens to the compounds disclosed in DE4435211 to arrive at the instantly claimed invention.

US 4,415,685 teaches that when a halogen is added to a phenyl group as opposed to a methyl group, there is a shift in the shade of color. One of ordinary

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skill would be motivated, therefore, to make the modification required to arrive at the instantly claimed invention with reasonable expectation of success for obtaining a compound with the same fluorescent activity. The motivation to make the claimed compound would be to make additional compounds for fluorescent purposes (i.e. in pigments) which would result in different shades of color.

Thus, the instant claims are *prima facie* obvious over the teachings of the prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KRISTIN BIANCHI whose telephone number is (571)270-5232. The examiner can normally be reached on Mon-Fri 7:30-5, alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisors, Janet Andres or Cecilia Tsang can be reached at 571-272-0867 and 571-272-0562, respectively. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kristin Bianchi
Examiner
Art Unit 4131

/Cecilia Tsang/
Supervisory Patent Examiner, Art Unit 4131

